ISSN (print) 0093-4666 © 2013. Mycotaxon, Ltd. ISSN (online) 2154-8889

MYCOTAXON

http://dx.doi.org/10.5248/123.343

Volume 123, pp. 343–352 *January–March 2013*

Three new cercosporoid fungi from the Brazilian Atlantic Forest

André L. Firmino, Danilo B. Pinho & Olinto L. Pereira*

Departamento de Fitopatologia, Universidade Federal de Viçosa, Viçosa, Minas Gerais, 36570-000, Brazil

* Correspondence to: *oliparini@ufv.br*

Abstract — Three new cercosporoid hyphomycetes were found associated with leaf spots on three host families in a stretch of Atlantic Forest in Viçosa, Minas Gerais, Brazil: *Pseudocercospora aurelianae* sp. nov. on *Aureliana velutina* (*Solanaceae*), *P. vicosae* sp. nov. on *Eupatorium* sp. (*Asteraceae*), and *Passalora rolliniae* sp. nov. on *Rollinia sylvatica* (*Annonaceae*). These three species are fully described, illustrated, discussed, and compared with allied species in the present work.

Key words — *Capnodiales*, *Dothideomycetes*, *Mycosphaerellaceae*, taxonomy, tropical fungi.

Introduction

Brazil is considered one of twelve countries with so-called mega-diversity. Covering the major biomes, the Atlantic Forest is regarded as one of the greatest repositories of biodiversity on the planet with ca. 20,000 plant species, of which 8000 are endemic (Myers et al. 2000). For example, in a single region in southern Bahia state, 450 angiosperms were reported per hectare (Varjabedian 2010). Because the Atlantic Forest has been reduced to 7.5 % of its original extent (Myers et al. 2000), the study of mycobiota in this endangered biome has priority.

The lack of knowledge of the mycobiota associated with Atlantic Forest plants can best be improved by comprehensive examination of certain fungal groups (Pinho et al. 2012). We decided to study cercosporoid hyphomycetes, as the knowledge of the diversity of this fungal group in tropical environments is still sparse. In addition, cercosporoids are among the largest groups of anamorphic fungi and are commonly associated with leaf spot diseases on almost all families of flowering plants worldwide (Crous & Braun 2003). First studies of cercosporoids in Brazil were made by Viégas and Batista (Viégas 1945; Silva & Minter 1995).

During the last decades, several papers have dealt with cercosporoid fungi from Brazil (Crous et al. 1997, 1999, 2011; Crous & Câmara 1998; Barreto et al. 1999). The majority of species have been reported in other biomes, mainly cerrado (Dianese & Câmara 1994; Medeiros & Dianese 1994; Inácio et al. 1996; Dianese et al. 1998, 1999; Braun et al. 1999; Furlaneto & Dianese 1999; Inácio & Dianese 1998, 1999; Braun & Freire 2002, 2004, 2006; Dornelo-Silva & Dianese 2003; Dornelo-Silva et al. 2007; Hernández-Gutiérrez & Dianese 2008, 2009; Freire & Braun 2009). Sporadic works on cercosporoid fungi in Atlantic Forest fragments revealed some new, undescribed species, such as the first reports of cercosporoid fungi on hosts of the family *Siparunaceae* and a revision of cercosporoids on *Piperaceae* (Pereira et al. 2003, 2006, 2007; Vieira & Barreto 2004; Pereira & Barreto 2005, 2006; Soares & Barreto 2005; Rocha et al. 2007, 2008, 2010; Silva & Pereira 2007, 2008, 2010, 2011; Alves et al. 2008; Macedo & Barreto 2008; Almeida et al. 2010; Alves & Barreto 2010; Machado et al. 2012; Silva et al. 2012). In this paper, we introduce three new species, one on *Solanaceae*, one on *Annonaceae*, and one on *Asteraceae*.

Material & methods

Small samples of the fungi were removed from fresh leaf spots and mounted in lactophenol. Observations, measurements and drawings were prepared using a Carl Zeiss Standard W light microscope (Göttingen, Germany). Representative specimens of the fungi were deposited in the herbarium of the Universidade Federal de Viçosa (Herbarium VIC).

Taxonomy

Pseudocercospora aurelianae Firmino & O.L. Pereira, **sp. nov.** Plate 1

MycoBank 800141

Differs from *Pseudocercospora carolinensis* and *P. marcelliana* by its light brown conidia, and from *P. modesta* by its shorter conidiophores and narrower conidia.

Type: Brazil, Minas Gerais, Viçosa, Estação Experimental Mata do Paraíso, on leaves of *Aureliana velutina* Sendtn. (*Solanaceae*), 25 May. 2009, A. L. Firmino (VIC 31847, **holotype**).

Etymology: referring to the host genus *Aureliana*.

Leaf spots epiphyllous, circular or irregular, 4–15 mm diam., necrotic, light brown, with distinct dark brownish margin. Colonies epiphyllous, pale brown. Stromata well developed, intraepidermal, 30–37.5 × 37.5–45 µm, brown. Conidiophores in dense fascicles, arising from stromata, straight, cylindrical to slightly attenuated towards a truncate tip, aseptate, rarely 1-septate, not geniculate, not branched, 8–20.5 × 2.5–4 µm, pale brown, uniform in color, thin-walled, smooth. Conidiophores reduced to conidiogenous cells (one-celled) or conidiogenous cells integrated, terminal, straight to slightly curved,

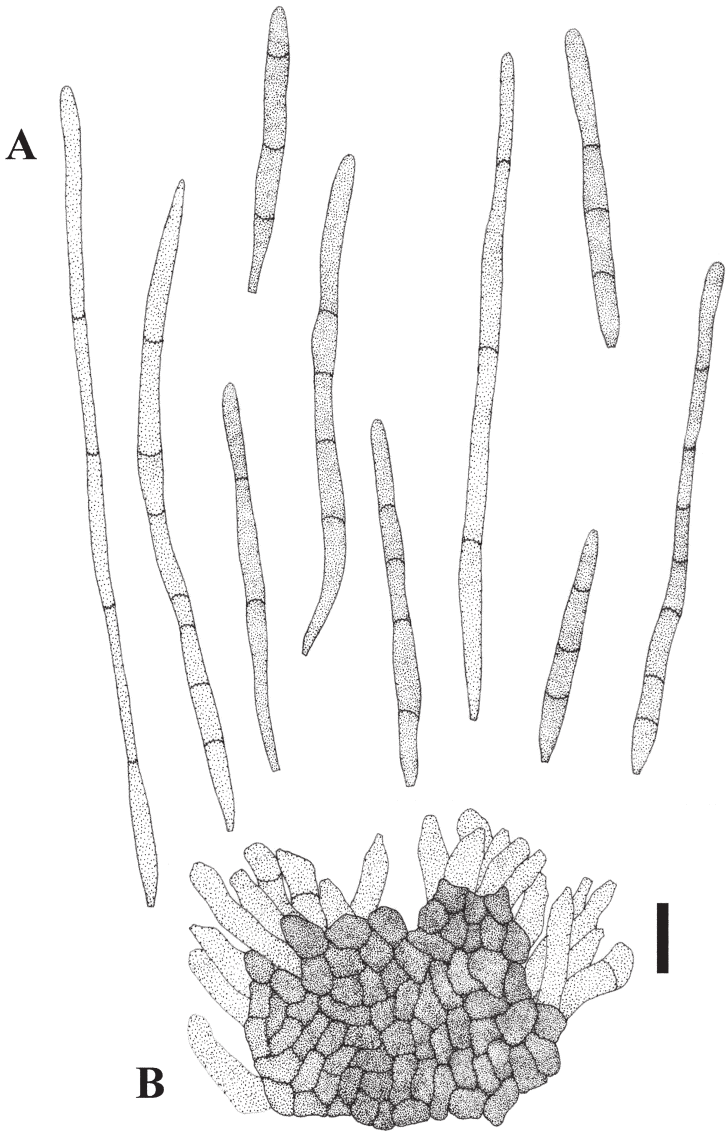

Plate 1. *Pseudocercospora aurelianae*.
A: Conidia. B: Stomata with conidiophores. Bar = 10 μm.

pale brown. Conidiogenous loci inconspicuous or only visible as truncate tip or lateral shoulder in geniculate conidiogenous cells after sympodial proliferation, but always unthickened and not darkened. Conidia solitary, straight to slightly curved, obclavate-subcylindrical to fusiform, 27–100.5 × 2.5–4 µm, 2–7-septate, light brown, smooth, apex obtuse to subacute, obconically truncate at the base, with hilum unthickened and not darkened.

Comments — Twenty-one *Pseudocercospora* species are known to associate with the *Solanaceae* (Chupp 1954; Crous & Braun 2003). The only species reported from Brazil are *Pseudocercospora atromarginalis* on *Capsicum annuum*, *P. daturina* on *Brugmansia suaveolens*, *P. solani-asperi* on *Solanum asperum*, and *P. venezuelae* on *S. argenteum* and *S. gilo* (Crous & Braun 2003). The new species is the first cercosporoid fungus reported on *Aureliana*.

Pseudocercospora aurelianae is morphologically close to *P. carolinensis* (Tharp) U. Braun & Crous and *P. marcelliana* (Chupp) U. Braun & Crous in the lack of superficial mycelium and the presence of well-developed stromata with short conidiophores forming sporodochial conidiomata, but *P. carolinensis* and *P. marcelliana* differ in their hyaline to subhyaline conidia (Chupp 1954). Like *P. aurelianae*, *P. modesta* (Syd.) Deighton has large stromata, but differs by its longer conidiophores (15–75 µm) and much broader conidia (4–6 µm; Chupp 1954).

Pseudocercospora vicosae Firmino & O.L. Pereira, **sp. nov.** Plate 2

MycoBank 800142

Differs from *Pseudocercospora eupatorii* by its shorter conidia.

Type: Brazil, Minas Gerais, Viçosa, Estação Experimental Mata do Paraíso, on leaves of *Eupatorium* sp. (*Asteraceae*), 4 May. 2009, A. L. Firmino (VIC 31848, **holotype**).

Etymology: referring to the type locality.

Leaf spots amphigenous, circular or irregular, 2–11 mm diam., never coalescent, dark brown. Colonies mainly epiphyllous, light brown. Stromata well-developed, intraepidermal, 47.5–70 × 55–97.5 µm diam., brown. Conidiophores loosely fasciculate, arising from stromata, unbranched, flexuous to curved, cylindrical, 18.5–56 × 3–4 µm, 1–2-septate, light brown, paler at the apex, thin-walled, smooth. Conidiogenous cells integrated, terminal, flexuous to curved, pale. Conidiogenous loci inconspicuous or only visible as truncate tip or subdenticulate lateral shoulder formed after sympodial proliferation, but always unthickened and not darkened. Conidia solitary, straight to slightly curved, obclavate to fusiforme, 20–91 × 2.5–4 µm, 1–8-septate, light brown, thin-walled, smooth, apex obtuse to subacute, obconically truncate at the base, hilum unthickened, not darkened.

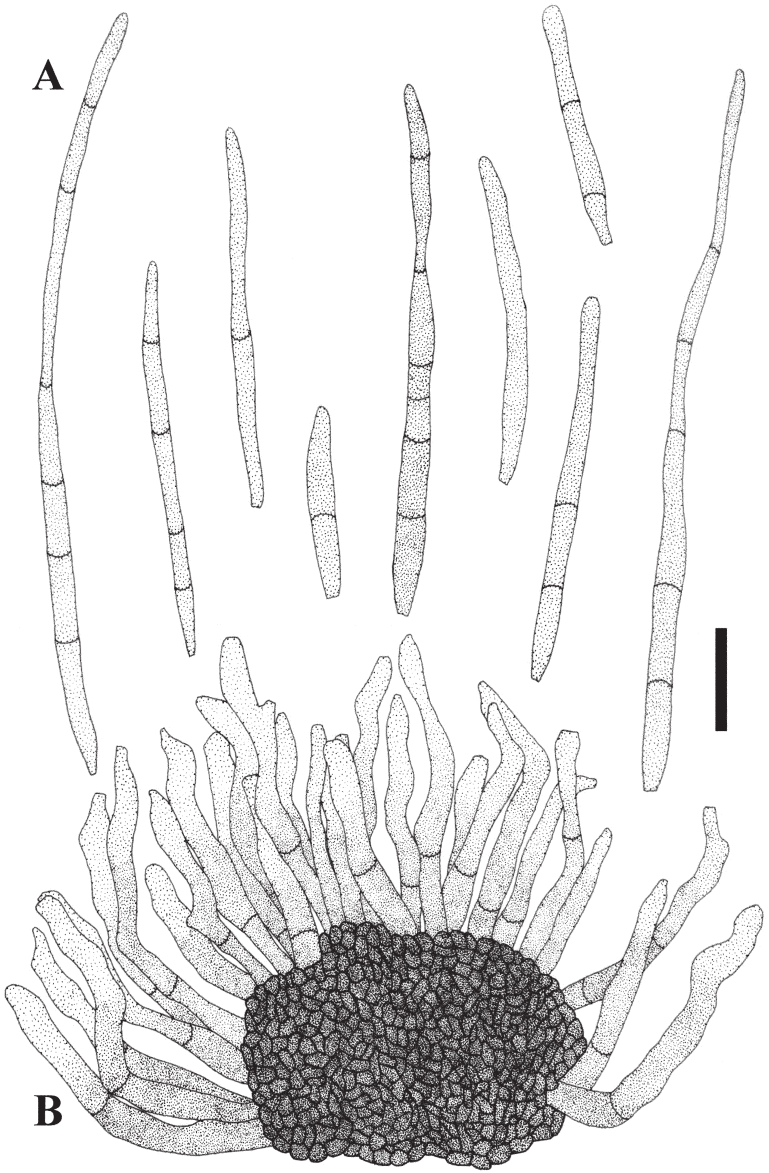

Plate 2. *Pseudocercospora vicosae*.
A: Conidia. B: Stomata with conidiophores. Bar = 10 µm.

Comments — Forty-two *Pseudocercospora* species are known to associate with the *Asteraceae* (Chupp 1954; Braun & Castañeda 1991; Crous & Braun 2003). The only two other species reported from Brazil are *P. elephantopodicola* on *Elephantopus* sp. (Braun & Freire 2006) and *P. plunkettii* on *Mikania micrantha* (Barreto & Evans 1995). Among the forty-two species of *Pseudocercospora* described in association with plants of this family, only *P. aciculina* (Chupp) U. Braun & Crous, *P. ageratoides* (Ellis & Everh.) Y.L. Guo, *P. eupatorii* (Peck) U. Braun & Castañeda and *P. eupatorii-formosani* U. Braun & Bagyan. are associated with *Eupatorium* spp. (Crous & Braun 2003).

Pseudocercospora vicosae is morphologically close to the North American *P. eupatorii* in the lack of superficial mycelium and the presence of well-developed stromata, but *P. eupatorii* differs in its shorter, rarely septate conidiophores (10–35 µm), and longer conidia (50–190 µm; Chupp 1954).

Passalora rolliniae Firmino & O.L. Pereira, **sp. nov.** Plate 3

MycoBank 800144

Differs from *Passalora miliusae* by its much longer and more septate conidiophores, its solitary or catenate light brown conidia, and its annonaceous host plant.

Holotype: Brazil, Minas Gerais, Viçosa, Estação Experimental Mata do Paraíso, on leaves of *Rollinia sylvatica* (A. St.-Hil.) Mart. (*Annonaceae*), 21 January. 2009, A. L. Firmino (VIC 31846, **holotype**).

Etymology: referring to the host genus *Rollinia*.

Leaf spots hypophyllous, circular or irregular, 1–9 mm diam., brown. Colonies mainly hypophyllous. Stroma absent, Conidiophores simple or mostly branched, straight to somewhat curved, 107–361 × 2.5–4.5 µm, 3–7-septate, solitary, erect olivaceous, smooth, thin-walled,. Conidiogenous cells integrated, terminal or intercalate, monoblastic or polyblastic (1–2 loci), olivaceous. Conidiogenous loci conspicuous, somewhat thickened and slightly darkened. Conidia solitary or catenate, straight to flexuous, cylindrical to clavate-obclavate, 6–37 × 2–4.5 µm, 0–3-septate, without constrictions at the septa, obconically attenuated at the base with a thickened and darkened hilum, apex rounded or attenuated, without hilum in solitary conidia or with a single or occasionally two hila in catenate conidia, light brown, thin-walled, smooth.

Comments — Six *Passalora* species are known to associate with the *Annonaceae* (Chupp 1954; Crous & Braun 2003). The only other species reported from Brazil are *Passalora annonigena* on *Annona* spp. and *P. xylopiae* on *A. dioica* and *Xylopia aromatica* (Braun & Freire 2002; Crous & Braun 2003). *Passalora rolliniae* is the first cercosporoid hyphomycete on *Rollinia*.

Passalora rolliniae morphologically resembles *Passalora miliusae* U. Braun & Crous (≡ *Mycovellosiella indica* P. Kumar & Kamal), which differs by its host plant (*Miliusa*, family *Rubiaceae*), its growth habit on the leaf hairs, its much

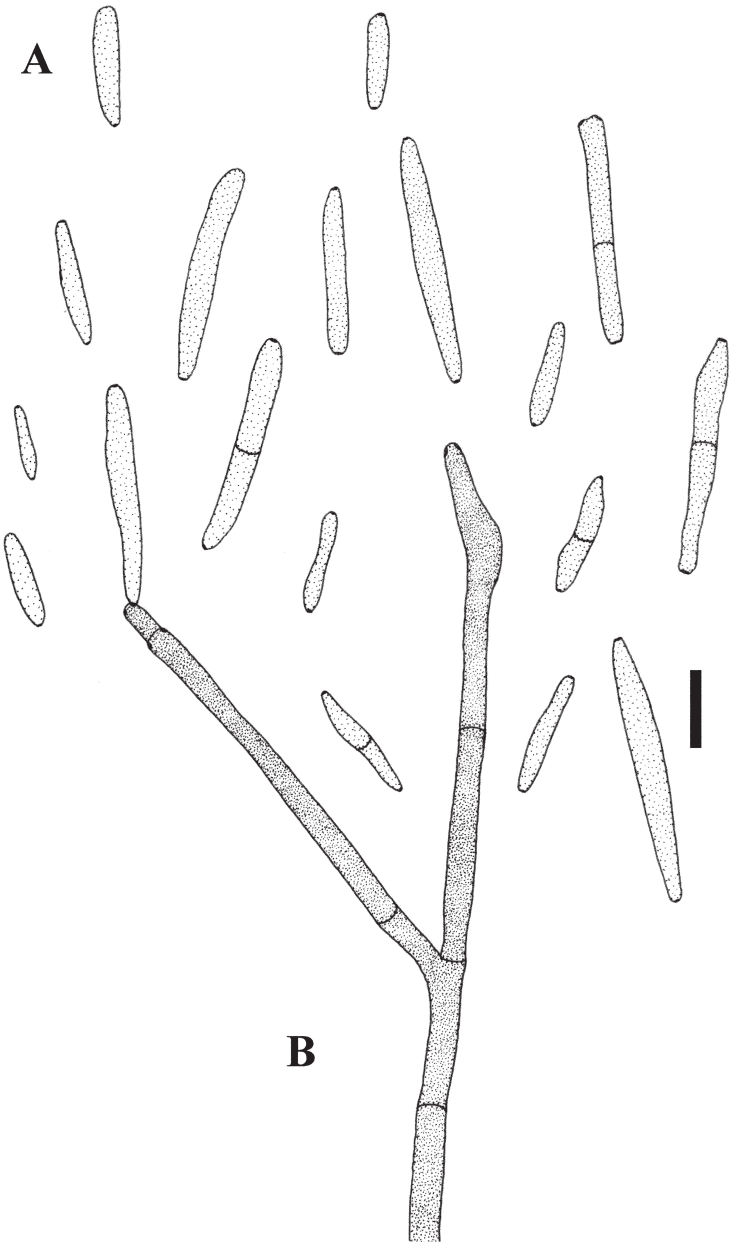

Plate 3. *Passalora rolliniae*.
A: Conidia. B: Conidiophores. Bar = 10 µm.

shorter and less septate conidiophores, and its larger, mostly solitary, subhyaline conidia [14.5–50 × <5.5 µm] (Kumar & Kamal 1982; Crous & Braun 2003).

Acknowledgments

The authors wish to thank Drs. Rafael Castañeda Ruiz (Instituto de Investigaciones Fundamentales en Agricultura Tropical) and Uwe Braun (Martin-Luther-Universität), for reviewing the manuscript.

Literature cited

Almeida DB, Macedo DM, Barreto RW. 2010. Leaf spot on *Clerodendrum* x *speciosus* in Brazil caused by *Pseudocercospora clerodendricola* sp. nov. Tropical Plant Pathology 35: 170–173. http://dx.doi.10.1590/S1982-56762010000300005

Alves JL, Barreto RW. 2010. *Pseudocercospora ixoricola* causing leaf spots on *Ixora coccinea* in Brazil. Plant Disease 94: 278–278. http://dx.doi.10.1094/PDIS-94-2-0278C

Alves JL, Barreto RW, Pereira OL. 2008. *Pseudocercospora cryptostegiae-madagascariensis* sp. nov. on *Cryptostegia madagascariensis*, an exotic vine involved in major biological in northeast Brazil. Mycopathologia 166: 87–91. http://dx.doi.10.1007/s11046-008-9120-5

Barreto RW, Evans HC. 1995. The mycobiota of the weed *Mikania micrantha* in southern Brazil with particular reference to fungal pathogens for biological control. Mycological Research 99: 343–352.

Barreto RW, Evans HC, Hanada RE. 1999. First record of *Cercospora pistiae* causing leaf spot of water lettuce (*Pistia stratioites*) in Brazil, with particular reference to weed biocontrol. Mycopathologia 144: 81–85. http://dx.doi.10.1023/A:1007014322695

Braun U, Castañeda Ruíz R. 1991. *Cercospora* and allied genera of Cuba (II). Cryptogamic Botany 2(2–3): 289–297.

Braun U, Freire FCO. 2002. Some cercosporoid hyphomycetes from Brazil II. Cryptogamie Mycologie 23: 295–328.

Braun U, Freire FCO. 2004. Some cercosporoid hyphomycetes from Brazil III. Cryptogamie Mycologie 25: 221–244.

Braun U, Freire FCO. 2006. Some cercosporoid hyphomycetes from Brazil IV. Cryptogamie Mycologie 99: 231–248.

Braun U, David J, Freire FCO. 1999. Some cercosporoid hyphomycetes from Brazil. Cryptogamie Mycologie 20: 95–106.

Braun U, Delhey R, Kiehr M. 2001. Notes on some cercosporoid hyphomycetes from Argentina. Fungal Diversity 6: 19–34.

Chupp C.1954. A monograph of the fungus genus *Cercospora*. Ithaca, Published by the author.

Crous PW, Braun U. 2003. *Mycosphaerella* and its anamorphs: 1. Names published in *Cercospora* and *Passalora*. CBS Biodiversity Series 1. 571 p.

Crous PW, Câmara MPS. 1998. Cercosporoid from Brazil. 2. Mycotaxon 68: 299–310.

Crous PW, Alfenas AC, Barreto RW. 1997. Cercosporoid fungi from Brazil. 1. Mycotaxon 64: 405–430.

Crous PW, Braun U, Alfenas AC. 1999. Cercosporoid fungi from Brazil. 3. Mycotaxon 72: 171–193.

Crous PW, Groenewald JZ, Shivas RG, Edwards J, Seifert KA, Alfenas AC, Alfenas RF, Burgess TI, Carnegie AJ, Hardy GESJ, Hiscock N, Huberli D, Jung T, Louis-Seize G, Okada G, Pereira OL, Stukely MJC, Wang W, White GP, Young AJ, McTaggart AR, Pascoe IG, Porter IJ, Quaedvlieg W. 2011. Fungal Planet description sheets: 69–91. Persoonia 26: 108–156. http://dx.doi.org/10.3767/003158511x581723

Dianese AC, Costa AM, Dianese JC. 1998. A new *Pseudocercospora* species on *Passiflora setacea*. Mycotaxon 105: 1–5.

Dianese JC, Câmara MPS. 1994. *Pseudocercospora aspidospermatis* – a new combination for *Bactrodesmiella aspidospermatis*. Sydowia 46: 225–232.

Dianese JC, Furlanetto C, Santos LTP. 1999. *Pseudocercospora zeyheriae,* a new combination for *Cercospora zeyrae*. Mycological Research 103: 40–42.

Dornelo-Silva D, Dianese JC. 2003. Hyphomycetes on the *Vochysiaceae* from Brazilian Cerrado. Mycologia 95: 1239–1251.

Dornelo-Silva D, Pereira-Carvalho RC, Dianese JC. 2007. New *Stenella* and *Parastenella* species from the Brazilian cerrado. Mycologia 99: 753–764. http://dx.doi.org/10.3852/ mycologia.99.5.753

Freire FCO, Braun U. 2009. Cercosporoid hyphomycetes on plants from Ceará State (Brazil). Revista Ciência Agronômica 40(1): 150–156.

Furlanetto C, Dianese JC. 1999. Some *Pseudocercospora* species and a new *Prathigada* species from Brazilian Cerrado. Mycological Research 103: 1203–1209.

Hernández-Gutiérrez A, Dianese JC. 2008. New cercosporoid fungi from the Brazilian Cerrado 1. Species on hosts of the families *Anacardiaceae*, *Araliaceae*, *Bombacaceae*, *Burseraceae* and *Celastraceae*. Mycotaxon 106: 41–63.

Hernández-Gutiérrez A, Dianese JC. 2009. New cercosporoid fungi from the Brazilian Cerrado 2. Species on hosts of the subfamilies *Caesalpinioideae*, *Faboideae* and *Mimosoideae* (*Leguminosae* s. lat.). Mycotaxon 107: 1–24.

Inácio CA, Dianese JC. 1998. Some Foliicolous Fungi on *Tabebuia* species. Mycological Research 102(6): 695–708.

Inácio CA, Dianese JC. 1999. A new *Mycovellosiella* species on *Myracrodruon urundueva*. Mycotaxon 72: 251–263.

Inácio CA, Furlanetto C, Hernandez-Gutierrez A, Dianese JC. 1996. Some *Cercospora* species originally described by Ahmés Pinto Viégas. Fitopatologia Brasileira 21: 405–409.

Kumar P, Kamal. 1982. A new species of *Mycovellisiella* from India. Current Science 51(17): 846–847.

Macedo DM, Barreto RW. 2008. *Cercospora neomaricae* sp. nov. causing leaf spots on *Neomarica caerulea*. Australasian Plant Pathology 37: 581–583. http://dx.doi.10.1071/ AP08058

Machado AR, Pinho DB, Silva M, Pereira OL. 2012. First report of leaf spot disease caused by *Cercosporella pfaffiae* on Brazilian ginseng (*Pfaffia glomerata*) in Brazil. Plant Disease 96: 1702. http://dx.doi.org/10.1094/PDIS-06-12-0614-PDN

Medeiros RB, Dianese JC. 1994. *Passalora eitenii* sp. nov. on *Syagrus comosa* in Brazil and a key to *Passalora* species. Mycotaxon 51: 509–513.

Myers N, Mittermeier RA, Mittermeier CG, Fonseca GAB, Kent J. 2000. Biodiversity hotspots for conservation priorities. Nature 403: 853–858.

Pereira OL, Barreto RW. 2005. The mycobiota of the weed *Mitracarpus hirtus* in Minas Gerais (Brazil) with particular reference to fungal pathogens for biological control. Australasian Plant Pathology 34: 41–50. http://dx.doi.10.1071/AP04083

Pereira OL, Barreto RW. 2006. *Pseudocercospora palicourea* sp. nov. associated with the toxic rubiaceous weed *Palicourea marcgravii* in Brazil, with observations on its mycobiota. Fungal Diversity 23: 243–253.

Pereira OL, Barreto RW, Bezerra JL. 2003. *Cercospora talini* on *Talinum patens* in Brazil. Fitopatologia Brasileira 28(2): 205–205. http://dx.doi.10.1590/S0100-41582003000200018

Pereira OL, Barreto RW, Braun U. 2006. *Passalora gochnatiicola* sp. nov. on *Gochnatia amplexifolia* from Serra do Cipó, MG, Brazil. Acta Botanica Brasilica 20: 203–206. http://dx.doi.10.1590/S0102-33062006000100019

Pereira OL, Barreto RW, Cavallazzi JRP, Braun U. 2007. The mycobiota of the cactus weed *Pereskia aculeata* in Brazil, with comments on the life-cycle of *Uromyces pereskiae*. Fungal Diversity 25: 167–180.

Pinho DB, Pereira OL, Firmino AL, Silva M, Ferreira-Júnior WG, Barreto RW. 2012. New *Meliolaceae* from the Brazilian Atlantic forest 1. Species on hosts in the families *Asteraceae*, *Burseraceae*, *Euphorbiaceae*, *Fabaceae* and *Sapindaceae*. Mycologia, 104(1): 121–137. http://dx.doi.10.3852/10-260

Rocha FB, Pereira OL, Barreto RW. 2007. *Cercospora apii* causing leaf spots on two brazilian toxic weeds: *Solanum glaucophyllum* and *Xanthium strumarium.* Brazilian Journal of Microbiology 38:142–144. http://dx.doi.10.1590/S1517-83822007000100029

Rocha FB, Soares DJ, Barreto RW. 2008. *Pseudocercospora* species on *Piperaceae* from Viçosa, Minas Gerais, Brazil. Mycological Progress 7: 249–252. http://dx.doi.10.1007/ s11557-008-0566-0

Rocha FB, Barreto RW, Bezerra JL, Neto JAAM. 2010. Foliar mycobiota of *Coussapoa floccosa*, a highly threatened tree of the Brazilian Atlantic forest. Mycologia 102: 1240–1252. http://dx.doi.10.3852/09-178

Silva M, Minter DW. 1995. Fungi from Brazil recorded by Batista and co-workers. Mycological Papers 169: 1–585.

Silva M, Pereira OL. 2007. A new species of *Pseudocercospora* on *Palicourea rigida* (*Rubiaceae*) from Minas Gerais, Brazil. Mycotaxon 102: 261–266.

Silva M, Pereira OL. 2008. Leaf-spot caused by *Pseudocercospora lythracearum* on *Lagerstroemia indica* in Brazil. Plant Pathology 57(4): 783. http://dx.doi.10.1111/j.1365-3059.2007.01799.x

Silva M, Pereira OL. 2010. *Pseudocercospora heliconiae* sp. nov. causing leaf blight on parakeet flower, *Heliconia psittacorum* (*Heliconiaceae*), in Brazil. Mycotaxon 113: 365–370. http://dx.doi.10.5248/113.365

Silva M, Pereira OL. 2011. *Pseudocercospora epidendri* sp. nov. on the neotropical orchid, *Epidendrum secundum* from Brazil. Mycotaxon 118: 95–101. http://dx.doi.10.5248/118.95

Silva M, Barreto RW, Pereira OL. 2012. Fungal pathogens of cat's claws from Brazil for biocontrol of *Macfadyena unguis-cati*. Mycotaxon 119: 181–195. http://dx.doi.org/10.5248/119.181

Soares DJ, Barreto RW. 2005. *Pseudocercospora siparunae* - a new cercosporoid fungus from the Brazilian tropical forest. Mycotaxon 92: 273–277.

Varjabedian R. 2010. Lei da Mata Atlântica: retrocesso ambiental. Estudos Avançados 24(68). http://dx.doi.10.1590/S0103-40142010000100013

Viégas AP. 1945. Alguns fungos do Brasil – *Cercosporae.* Boletim da Sociedade Brasileira de Agronomia 8(1): 1–160.

Vieira BS, Barreto RW. 2004. First record of *Cercospora richardiaecola* causing leaf spots on *Zantedeschia aethiopica* in Brazil. Plant Pathology 53: 813. http://dx.doi.10.1111/j.1365-3059.2004.01083.x